

Sample UBD Unit for Middle School Technology Education

South Dakota Middle School Technology Education Course Content Standards Covered:

- TEMS.1.2 Examine the core relationships between technology and other areas of study
- TEMS.3.1 Demonstrate an understanding of the components of design (feedback loop)
- TEMS.3.2 Demonstrate an understanding of engineering design
- TEMS.3.3 Apply the design process
- TEMS.4.1 Apply appropriate safety practices
- TEMS.4.4 Select and use information and communication technologies.
- TEMS.4.5 Select and use transportation technologies.
- TEMS.4.6 Select and use manufacturing technologies.
- TEMS.4.7 Select and use construction technologies.

Technology Education Standard #19

Students will develop an understanding of and be able to select and use manufacturing technologies.

The Addressed Benchmarks for this 8th Grade Manufacturing Backwards Design Unit Include:

- Manufacturing goods
- Manufacturing processes
- Materials use
- Marketing products

8th grade Manufacturing Unit (12-15 days)

Identify desired results:

Students will demonstrate knowledge of....

- Manufacturing goods
- Manufacturing processes
- Materials use
- Marketing products

What will students understand as a result of this unit?

- Students will understand all of the steps involved in the manufacturing process.
- Students will understand why different materials are used in certain manufacturing processes.
- Students will understand the role of marketing in manufacturing.

What are the overarching “essential” questions?

- Why is the manufacturing process so important?
- How does the manufacturing process affect me? (the student)

What “essential” and “unit” questions will focus this unit?

- What is manufacturing?
- How does the manufacturing process affect a business?

What evidence will show that students understand manufacturing?

- Students will create a redwood house sign (example: *The Anderson’s*) using the manufacturing process.
- Students will create a fictitious house sign business of their own.
- Students will describe all of the steps involved in their house sign business. This will include: selection of

materials and why, how materials are formed (tools required), cost (of materials and selling price), and marketing procedures. This will act as a presentation to a group of potential investors (the rest of the class and the instructor).

- Vocabulary quiz
- Short answer quiz on manufacturing process

Other Evidence:

- I will be making observations throughout the projects and “jumpstarting” their thinking with probing questions.

Student Self-Assessment:

- Self assess your house sign project (Students will examine their work and compare it to the example, they will note what they would do different if they attempted the process again. This will also help them when they write their business plan.)
- Self assess your knowledge of the manufacturing process (They will talk about what they understand as the manufacturing process and then read provided materials to determine if they are correct or if they need to make some changes when doing their business design.)
- Self assess your house sign business (After the initial business is set up the students will be asked to self assess after hearing prompts from me. They will make changes and then present to the class.)

Given the targeted understandings, other unit goals, and the assessment evidence identified, what knowledge and skills are needed?

Students will need to know...

- Key terms: manufacturing, marketing, material, goods, durable, non-durable, profit
- Types of material
- Methods of advertising
- Identify cost and profit

Students will need to be able to...

- Demonstrate and apply the manufacturing process
- Organize an informal report or “sales pitch” of their house sign business
- Research costs using the internet

What teaching and learning experiences will equip students to demonstrate the targeted understandings?

1. Students will present a business plan showing how the manufacturing process will be implemented in their potential “house sign” business.
2. Give the students explanations and examples of the importance of the manufacturing process.
3. Students will complete a manufacturing process by manufacturing a house sign.
4. Prompt the students with periodic questions relating to their business plan, in hopes of creating a deeper thinking.
5. Assess and give feedback on the house sign.
6. Assess and give feedback on the business plan.
7. Have students research costs of materials on-line and locally.

To make the lesson on manufacturing more rigorous it should cross paths with “core” subject areas. One of the main focuses in technology education across the state of South Dakota is to relate the technology education curriculum to other content areas and their standards.

The design and planning part of the module is a part that can involve these other core content areas. The students will identify on a map where redwood is found in the United States and they will research why the price fluctuates as much and often as it does (social studies).

The students will also figure out exactly how much profit they would make if they owned a sign making company that made signs similar to the one they manufactured. They are given a chance to first research (internet or by contacting appropriate businesses) proper costs for various aspects of the business. After they do their research, the instructor will give all of the students fixed numbers to use for the cost of wood, wages, operating expenses, etc. (math). This will create a level playing field for every group and eliminate questionable figures found

in the research or lack there of.

In relation to science, the students are asked to determine why choosing redwood instead of cheaper wood such as pine is a good decision. In other words....Why do certain woods break down due to the “elements” faster than other woods?

As a capstone, The instructor will call for a portfolio of all of the suggested information above. This is the ultimate assessment tool for the unit. The students will be given a rubric up front describing the required parts of the portfolio and how they will be evaluated. This portfolio would include profit margins and any recommendations they would have for their company. The portfolio presentations will actually be turned into a competition challenging the kids to find cheaper suppliers and ways to cut cost yet maintain a quality product. This portfolio would be a more than sufficient form of assessment that will be checked for spelling, grammar etc. (language arts). After a trial presentation to the instructor, the students are given feedback so they can make any necessary changes and then the portfolio or business plan will be presented to the rest of the class (acting as a group of potential investors). The class will then vote to determine if the group “sold” themselves to the investors. The portfolio will also include the vocabulary quiz, their self-assessments, their short answer quiz, and the instructors observations. Hands-on learning affords students an avenue to explore their ideas in a contained supervised situation. Technology education provides active learning, which allows students to do things and think about things while they are doing them (Bonwell & Eison, 1991). This manufacturing unit will provide a great opportunity for students to be active learners. The portfolio and presentation are a reliable measurement of the targeted understanding in relation to the manufacturing process.

In doing this, four of the benchmarks would be covered and the students gain a much needed application of core standards. Questions like “why do we have to learn this stuff?” could be addressed. This is a great deal to ask of a middle school student. It will definitely challenge them and encourage the use of metacognition to assure a well thought out business proposal.

Gilberti & Dugger (2002) offer these thoughts on why manufacturing technology is a necessity. “Our lives have been enhanced because of manufacturing technology. It provides a segment of the population with jobs; it is a major factor in the economy; and it provides us with many products that improve the quality of life (pg. 182).”

References

Bonwell, C.C., & Eison, J.A., (1991). Active learning: Creating excitement in the classroom (ASHE-ERIC Higher Education Report No. 1). Washington, DC: The George Washington University, School of Education and Human Development.

Gilberti, A.F., & Dugger, W.E., Jr., (2000). Standards for technological literacy: *Content for the study of technology*. Virginia; International Technology Education Association.

Wiggins, G., & McTighe, J., (2005). Understanding by Design. Association for Supervision and Curriculum Development. Alexandria, Virginia.